Fisheries and Oceans Canada | Pêches et Océans Canada | NOAA FISHERIES NATIONAL MARINE FISHERIES SERVICE

Transboundary Resource Assessment Committee

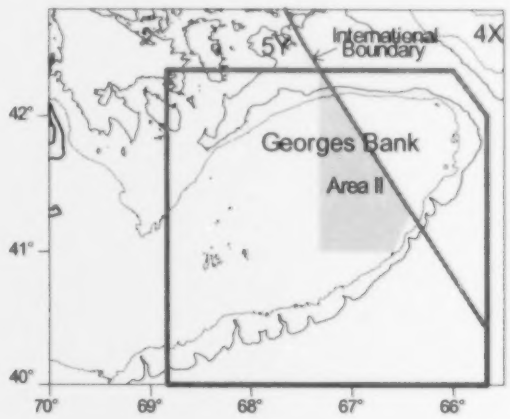
Status Report 2006/03

GEORGES BANK

YELLOWTAIL

FLOUNDER

[5Zhjmn;
522,525,551,552,561,562]



Summary

- Combined Canada and USA catches in 2005 were 4,150 mt.
- Adult biomass (ages 3+) increased from a low of 2,200 mt in 1995 to 11,300 mt in 2003 and then declined to 5,450 mt at the beginning of 2006.
- Recruitment improved from the mid-1990s averaging 23.5 million fish at age 1 during 1998-2001 but has since declined to 9.2 million in 2005.
- Fishing mortality for fully recruited ages 4+ has been close to or above 1.0 between 1973 and 1994, fluctuated between 0.6 and 0.9 from 1995-2003, increased in 2004 to 1.92, and then declined in 2005 to 1.37.
- Truncated age structure in the surveys and change in distribution indicate current resource productivity may be limited relative to historical levels.
- Assuming a 2006 catch equal to the 3,000 mt quota, a combined Canada/USA catch of about 1,250 mt in 2007 would result in a neutral risk (~50%) that the fishing mortality rate in 2007 will exceed F_{ref} =0.25. Fishing at F_{ref} in 2007 will generate a 66% increase in median age 3+ biomass from 5,600 mt in 2007 to 9,200 mt in 2008.

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http://www.mar.dfo-mpo.gc.ca/science/TRAC/trac.html

Canada

July 2006

Catches, Biomass (thousands mt); Recruits (millions)

		1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	Avg[1]	Min[1]	Max[1]
Canada	Quota	0.8	1.2	2.0	3.0	3.4	2.9	2.3	1.9	1.7	0.9			
	Landed	0.8	1.2	2.0	2.9	2.9	2.6	2.1	0.1	<0.1		0.6	<0.1	2.9
	Discard	0.4	0.7	0.6	0.4	0.8	0.5	0.8	0.4	0.3		0.5	0.3	0.8
USA	Quota[5]								6	4.3	2.1			
	Landed	1.0	1.8	2.0	3.7	3.8	2.5	3.3	6.2	3.3		5.0	0.4	15.9
	Discard	<0.1	0.1	0.5	0.4	0.3	0.2	0.4	0.5	0.5		0.6	<0.1	3.0
Total	Quota								7.9	6.0	3.0			
	Catch	2.3	3.8	5.0	7.4	7.9	5.9	6.6	7.3	4.2		6.8	1.2	17.2
Adult Biomass[3]		5.1	6.4	7.9	10.3	10.7	9.2	11.3	9.1	5.7	5.4	7.5[2]	2.0[2]	26.4[2]
SSB		5.7	7.0	9.5	10.4	9.4	10.5	10.4	6.4	5.4		7.7	2.6	21.9
Age 1 Recruits		18.4	23.9	25.5	21	23.7	15.9	17.1	11.9	9.2		22.3	6.6	70.1
Fishing mortality[4]		0.71	0.78	0.70	0.89	0.95	0.62	0.58	1.92	1.37		1.07	0.58	1.92
Exploitation Rate[4]		47%	50%	46%	54%	56%	42%	40%	80%	69%		59%	40%	80%

[1]1973 – 2005
[2]1973 - 2006
[3]Jan-1 ages 3+
[4]ages 4+
[5]for fishing year May 1 – April 30

Fishery

Combined Canada/USA catches of Georges Bank yellowtail flounder peaked at about 20,000 mt during the mid 1960s and early 1970s. The USA fishery accounted for most of the catches during the late 1960s and early 1970s. The combined Canada/USA catch increased from 1995 through 2001, averaged 6,600 mt per year during 2002-2004, but declined from 2004 (7,275 mt) to 2005 (4,150 mt; Figure 1).

The 2005 **Canadian catch** of 347 mt was well below the Canadian quota of 1,740 mt, with landings of only 30 mt and estimated discards of 317 mt. Canadian fishermen were unable to find commercial densities of yellowtail in 2005, similar to the situation in 2004 when landings were 96 mt. Discards were due only to the sea scallop dredge fishery.

USA catches in 2005 were 3,803 mt, a 44% decline from 2004, with landings of 3,327 mt and discards of 476 mt. There was not a Special Access Program for yellowtail in Closed Area II in 2005, as occurred in 2004. The USA landings in 2005 were predominantly from the trawl fishery while discards came from both the trawl and scallop dredge fisheries.

Ages 2-4 accounted for most of the **combined Canada/USA fishery** catch in 2005 by number, with few age 1 fish caught due to mesh regulations. Older fish (ages 5+) were caught in lower proportions in 2005 than in 2004. Both the Canadian and USA fisheries were well sampled to determine length composition of the catch.

Harvest Strategy and Reference Points

The Transboundary Management Guidance Committee has adopted a strategy to maintain a low to neutral risk of exceeding the fishing mortality limit reference, $F_{ref} = 0.25$. When

stock conditions are poor, fishing mortality rates should be further reduced to promote rebuilding.

State of Resource

The state of the resource was based on survey observations and the range of results from plausible age structured analytical assessments (VPA) that used fishery catch statistics and sampling for size and age composition of the catch for 1973 to 2005. The VPAs were calibrated to trends in abundance from three bottom trawl survey series (NMFS spring, NMFS fall and DFO) and a recruitment index from the NMFS scallop survey. Three VPA formulations were examined based on recommendations from the 2005 benchmark assessment review: 1) Base Case, the same formulation as used in the 2004 assessment, 2) Minor Change, and 3) Major Change. As was the case last year, the Minor Change VPA was not accepted during this TRAC review due to implausible results. Splitting the time series is the major difference between the Base Case and the Major Change VPAs. The Major Change VPA was modified to ages 6+ because of the zero catch for ages 9-12 in 2005. Retrospective analyses were used to detect any patterns to consistently overestimate or underestimate fishing mortality, biomass, and recruitment relative to the terminal year estimates. The Base Case VPA continues to display a retrospective pattern, updating population biomass estimates to lower values than previously determined and compromising interpretation of results, although the magnitude of the retrospective pattern is less than in previous years. The Major Change VPA did not exhibit a retrospective pattern; updates were both above and below previously estimated values (range 47% decrease to 59% increase). The Major Change VPA shows unexpected large increases in survey catchability since the mid 1990s that are not understood. The Major Change VPA better reflects the recent decreasing trend observed in all three surveys (Figures 2-3) and is recommended as the basis for management advice.

Population biomass (ages 3+), based on the Major Change VPA results, increased from a low of 2,200 mt in 1995 to 11,300 mt in 2003 and then declined to 5,450 mt at the beginning of 2006 (80% Confidence Interval: 4,000-6,800 mt) (Figure 3). Spawning stock biomass in 2005 was estimated to be 5,400 mt (80% Confidence Interval: 4,600-6,600 mt).

Trends in age 3+ biomass from the Base Case VPA do not display a decline in recent years as indicated by all three surveys (Figures 2-3) and this model is not recommended as the basis for management advice.

Recruitment improved from the mid-1990s averaging 23.5 million fish at age 1 during 1998-2001 but has since declined to 9.2 million in 2005. Previous assessments indicated the presence of some large recruitment in the late 1990s and early 2000s, but the size of these cohorts is now estimated to be much lower.

Fishing mortality for fully recruited ages 4+ was close to or above 1.0 between 1973 and 1994, fluctuated between 0.6 and 0.9 from 1995-2003, increased in 2004 to 1.92, and then declined in 2005 to 1.37 (80% Confidence Interval: 1.06-1.70) (Figure 1). Fishing

mortality has been well above the reference point of $F_{ref} = 0.25$ for the entire time series, in contrast to the perception of being below F_{ref} since 1995 as estimated in pre-2005 assessments.

Productivity

Age structure, spatial distribution, and fish growth reflect changes in the productive potential. In both absolute numbers and percent composition, the **population age structure** estimated by the VPA displays a truncated pattern with few old fish. As abundance continues to decline, **spatial distribution patterns** in the 2005 and 2006 surveys show yellowtail were caught in fewer strata relative to previous years. DFO survey average weights at length, used to reflect fish **condition**, have been low in the past three years. Truncated age structure in the surveys and changes in distribution indicate current resource productivity may be limited relative to historical levels.

Outlook

This outlook is provided in terms of consequences with respect to the harvest reference points for alternative catch quotas in 2007. Uncertainty about standing stock generates uncertainty in forecast results which is expressed here as the risk of exceeding $F_{ref} = 0.25$. The risk calculations assist in evaluating the consequences of alternative catch quotas by providing a general measure of the uncertainties. However, they are dependent on the data and model assumptions and do not include uncertainty due to variations in weight at age, partial recruitment to the fishery, natural mortality, systematic errors in data reporting or the possibility that the model may not reflect stock dynamics closely enough. It is considered that in this assessment these uncertainties, particularly those associated with the changes in survey catchabilities, are more problematic than in other assessments. As such, the risk plots do not capture the extent of uncertainty of the consequences for various catch levels and should be used in a precautionary manner.

Due to trends in weights at age and the fishery partial recruitment pattern over time, averages for 2003-2005 were used in the projections. Assuming that the TAC of 3,000 mt is caught in 2006, a combined Canada/USA catch of about 1,250 mt in 2007 would result in a neutral risk (~50%) that the fishing mortality rate in 2007 will exceed F_{ref}. Fishing at F_{ref} in 2007 will generate a 66% increase in median age 3+ biomass from 5,600 mt in 2007 to 9,200 mt in 2008.

Due to the truncated age structure, medium term projections are highly dependent on future recruitment and therefore were not conducted.

Special Considerations

Consistent management by Canada and USA is required to ensure that conservation objectives are not compromised.

Although the Major Change VPA is recommended for management decisions, the mechanism for the large changes in survey catchability are not easily explained. These changes in survey catchability are most appropriately thought of as an aliasing of an unknown mechanism that produces a better fitting model. The inability to plausibly explain these survey catchability changes causes increased uncertainty in this assessment relative to other assessments. However, the Major Change VPA results more closely reflect the decline in abundance observed in all three surveys and is the preferred model from which to make management decisions.

Assuming a TAC of 3,000 mt is caught in 2006 will result in a fishing mortality rate of 0.83, well above F_{ref} = 0.25. Given the addition of the most recent survey data, the decline in the resource is now much greater than was estimated in last year's assessment. As such, the fishing mortality associated with the 2006 TAC is much higher than estimated in the 2005 assessment.

Source Documents

Legault, C.M., H.H. Stone, and K.J. Clark. 2006. Stock Assessment of Georges Bank Yellowtail Flounder for 2006. TRAC Reference Document 2006/(in prep.).

TRAC. 2005. S. Gavaris, R.O'Boyle, and W. Overholtz [eds.]. 2005. Proceedings of the Transboundary Resources Assessment Committee (TRAC): Benchmark Review of Stock Assessment Models for the Georges Bank Yellowtail Flounder Stock; 25 – 26 January 2005 and 26 – 29 April 2005. TRAC Proceedings 2005/01: 65p.

TRAC. 2006. Proceedings of the Transboundary Resource Assessment Committee (TRAC); 13–16 June 2006. TRAC Proceedings 2006/(in pref).

Correct Citation:

TRAC, 2006. Georges Bank Yellowtail Flounder. TRAC Status Report 2006/03.

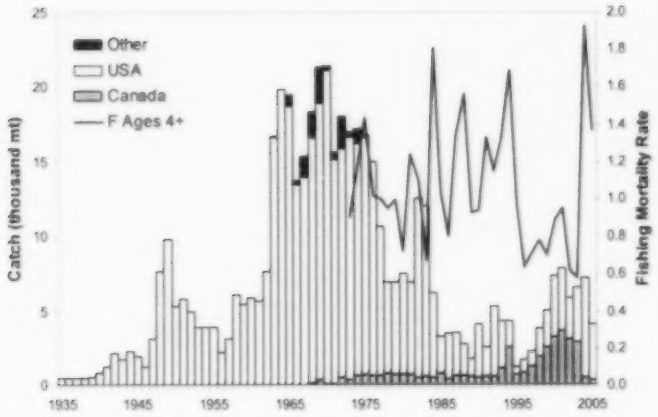

Figure 1. Catches and fishing mortality.

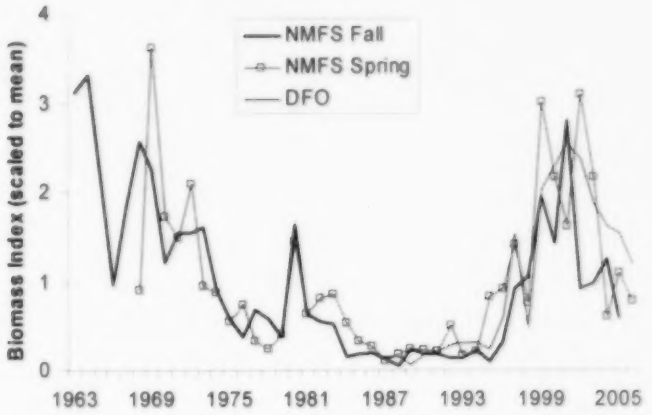

Figure 2. Survey weight (kg/tow) scaled to mean of 1987-2005.

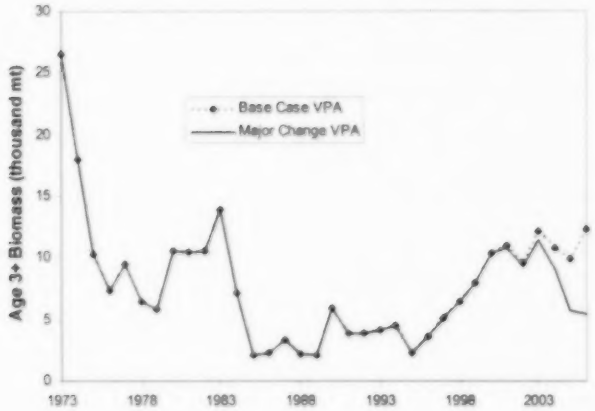

Figure 3. Age 3+ biomasses.

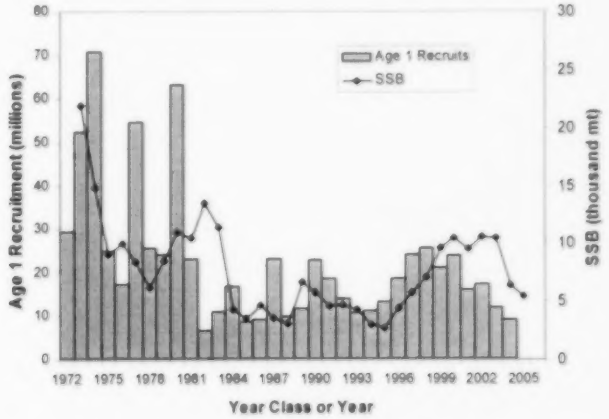

Figure 4. Recruitment and spawning stock biomass.

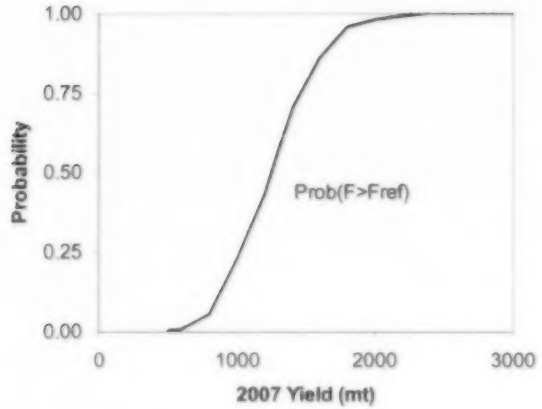

Figure 5. Projection risks.